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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF	:
SHAHRAM MIHAN, ET AL.	: EXAMINER: BULLOCK, IN SUK C.
SERIAL NO: 10/506,602	:
FILED: SEPTEMBER 10, 2004	: GROUP ART UNIT: 1797
FOR: OLIGOMERIZATION OF OLEFINS COMPRISING AT LEAST THREE CARBON ATOMS	:

REPLY BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

In response to the Examiner's Answer dated February 7, 2008, please consider the following remarks:

For reference, claim 1 of the present application recites "[a] process for the oligomerization of α-olefins having at least three carbon atoms, in which the olefin is brought into contact with a catalyst system obtainable from a) at least one chromium source; b) at least one ligand comprising 1,3,5-tri-n-dodecyl-1,3,5-triazacyclohexane; and c) at least one activator comprising a boron compound, with the molar ratio of B:Cr being at least 5."

The Examiner asserts that Maas discloses a catalyst including each of components (a), (b), and (c). *See* Examiner's Answer, pages 4 to 5. The Examiner points to Maas' general description of the disclosed catalyst at column 1, lines 6 to 30, description of 1,3,5-triazacyclohexanes at column 3, lines 12 to 26, and description of boron compounds at column 7, lines 54 to 58. *See* Examiner's Answer, pages 4 to 5. However, Maas does not

disclose, in a single embodiment, employing a catalyst including a combination of features (a), (b) and (c) recited in claim 1 – that is, there is no instance in which Maas discloses a single catalyst that satisfies claim 1. In the one Example in Maas employing 1,3,5-tri-n-dodecyl-1,3,5-triazacyclohexane, n-butyl bromide and ethylaluminum dichloride are added, there is no boron compound present. *See* Maas, column 10, lines 62 to 67; Table 1. In those Examples in Maas employing boron compounds, 1,3,5-tri-n-dodecyl-1,3,5-triazacyclohexane is not employed. *See* Maas, Table 2.

The Examiner asserts that Maas discloses only a limited number of combinations of components and, thus, one could arrive at the best combination through only routine experimentation. *See* Examiner's Answer, pages 5 to 6. Appellants respectfully disagree with this assertion. Maas discloses numerous 1,3,5-triazacyclohexanes (*see* Maas, column 2, line 39 to column 3, line 26) that can be complexed with numerous chromium compounds (*see* Maas, column 4, line 51 to column 51 to column 5, line 10), along with numerous activating additives (*see* Maas, column 5, line 40 to column 8, line 14). Moreover, these numerous components are disclosed to be combinable in wide ranges of proportions. *See* Maas, column 6, lines 36 to 38, column 8, lines 5 to 8. To achieve the method of claim 1, a skilled artisan need not only identify the particular components (a), (b) and (c) recited in claim 1 from the expansive disclosure of Maas, but then also identify the particular proportion of components (a) and (c) recited in claim 1. Appellants submit that Maas simply does not provide guidance by which one of ordinary skill in the art would have made such a selection – Maas cannot fairly be said to suggest each and every permutation encompassed by its disclosure, much less the particular combination of features recited in claim 1.

The Examiner asserts that the experimental results set forth in the present specification do not constitute objective evidence of nonobviousness. *See* Examiner's Answer, pages 6 to 7. The Examiner asserts that Comparative Example 4 of the present

application does not correspond to the closest catalyst in Maas – the Examiner believes that comparison should have been made to the catalyst including "chromium complex 3" in Maas because "chromium complex 3" includes 1,3,5-tri-n-dodecyl-1,3,5-triazacyclohexane, as recited in claim 1. *See* Examiner's Answer, page 6. It has been held that "[a] comparison of the claimed invention with the disclosure of each reference to determine the number of claim limitations in common with each reference, bearing in mind the relative importance of particular limitations, will usually yield the closest single prior art reference." *See* MPEP §716.02(e) (citing *In re Merchant*, 575 F.2d 865, 868 (CCPA 1978)) (emphasis added). As discussed above, the only Example including "chromium complex 3" does not include an activator including a boron compound. *See* Maas, column 10, lines 62 to 67. Claim 1 requires a boron compound and that the boron compound be present in a specific molar ratio with chromium also included in the employed catalyst. Appellants submit that Comparative Example 4 of the present application (which corresponds to Example 21 of Maas – *see* present specification, page 5, line 45) is the closest example in Maas to the presently claimed invention and, thus, should be given due weight. Comparison of Examples 1 and 2 and Comparative Example 4 of the present application demonstrates that selecting 1,3,5-tri-n-dodecyl-1,3,5-triazacyclohexane, in combination with the other features recited in claim 1, provides an unexpected, superior result in comparison with a catalyst in Maas in which such selection was not made.

The Examiner asserts, with respect to the comparison of Examples 1 and 2 to Comparative Example 3 in the present application, that Examples 1 and 2 are not commensurate in scope with the present claims. *See* Examiner's Answer, page 7. At the outset, Appellants would like to point out that Comparative Example 3 of the present application, which includes 1,3,5-tri-n-dodecyl-1,3,5-triazacyclohexane and a boron-containing compound, is closer in scope to claim 1 than any Example included in Maas.

Further, the comparison of Comparative Example 3 to Examples 1 and 2 in the present application, demonstrates that employing the particular molar ratio of boron and chromium recited in claim 1 provides unexpected, superior performance relative to an otherwise identical composition that does not employ that molar ratio. It has been held that the nonobviousness of a genus can be supported by data showing unexpected results for a species. *See* MPEP §716.02(d).I (citing *In re Kollman*, 595 F.2d 48 (CCPA)). In this case, Appellants submit that one of ordinary skill in the art would conclude from the performance of the catalysts of Examples 1 and 2 of the present specification, which employ a boron to chromium molar ratio of 10, are exemplary of catalysts within the scope of claim 1. This is evidenced, for example, by the fact that superior results are maintained, even when a different combination of activators is employed. Appellants submit that the experimental evidence in the present application is commensurate in scope with the current claims, and that the comparison of Examples 1 and 2 and Comparative Example 3 of the present application demonstrates that selecting a boron to chromium molar ratio in excess of 5, in combination with the other features recited in claim 1, provides an unexpected, superior result in comparison with a catalysts, such as in Maas, in which such selection was not made.

Appellants respectfully request that the rejection over Maas be reversed, in view of the foregoing comments and the comments set forth in the Appeal Brief filed November 13, 2007.

Respectfully submitted,

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